guide vanes **70** and outlet guide vanes **72** are stationary guide vanes that are coupled to frame **15**. Moreover, in this embodiment, the first stage **600** of second rotor section **60** is disposed upstream from a first stage **602** of first rotor section **60**.

[0035] A method to assemble the turbofan engine assembly described herein includes providing a core gas turbine engine including a high-pressure compressor, a combustor, and a turbine, coupling a counter-rotating booster compressor to the core gas turbine engine, the counter-rotating booster compressor including a first rotor section configured to rotate in a first direction and a second rotor section configured to rotate in an opposite second direction, coupling a gearbox to at least one of the first and second rotor sections, and coupling a low-pressure turbine to the gearbox such that the gearbox is driven by the low-pressure turbine.

[0036] The turbofan engine assembly described herein includes a single stage fan assembly, a low-pressure turbine, and a counter-rotating booster compressor. As such, the turbofan engine assembly described herein includes a plurality of arrangements to drive the counter-rotating booster compressor. Specifically, the exemplary turbofan engine assembly includes a geared counter-rotating booster that includes a rotating radially outer portion and a rotating radially inner portion that each include a plurality of blades that are interdigitated to form the counter-rotating booster.

[0037] To facilitate reducing the quantity of booster stages while still maintaining a significant pressure rise through the booster compressor, the booster compressors described include a rotating inner portion that may be driven by either the gearbox or directly from the low-pressure turbine, wherein a second rotating portion of the booster compressor may also be driven by the gearbox. As such, the various geared booster compressor arrangements described herein, each facilitate providing a turbofan engine assembly that achieves maximum performance including a low fan pressure ratio and a high bypass ratio with out adding additional stages to the high-pressure compressor, thus reducing the size and cost of the core gas turbine engine.

[0038] While the invention has been described in terms of various specific embodiments, those skilled in the art will recognize that the invention can be practiced with modification within the spirit and scope of the claims.

What is claimed is:

1. A method of assembling a turbofan engine assembly comprises:
- providing a core gas turbine engine including a high-pressure compressor, a combustor, and a turbine;
- coupling a counter-rotating booster compressor to the core gas turbine engine, the counter-rotating booster compressor including a first rotor section configured to rotate in a first direction and a second rotor section configured to rotate in an opposite second direction;
- coupling a gearbox to at least one of the first and second rotor sections; and
- coupling a low-pressure turbine to the gearbox such that the gearbox is driven by the low-pressure turbine.

2. A method in accordance with claim **1** further comprising:
- coupling a drive shaft to the low-pressure turbine; and
- coupling the gearbox between the drive shaft and the first rotor section such that the first rotor section rotates at a rotational speed that is different than the rotational speed of the low-pressure turbine.

3. A method in accordance with claim **1** further comprising:
- coupling a drive shaft to the low-pressure turbine; and
- coupling the gearbox between the drive shaft and the second rotor section such that the second rotor section rotates at a rotational speed that is different than the rotational speed of the low-pressure turbine.

4. A method in accordance with claim **1** further comprising:
- coupling a drive shaft to the low-pressure turbine; and
- coupling a fan assembly to the drive shaft such that the fan assembly rotates at a rotational speed that is the same as the rotational speed of the low-pressure turbine.

5. A method in accordance with claim **1** further comprising:
- coupling a drive shaft to the low-pressure turbine; and
- coupling the gearbox between the drive shaft and the fan assembly such that the fan assembly rotates at a rotational speed that is different than the rotational speed of the low-pressure turbine.

6. A method in accordance with claim **1** further comprising:
- coupling a drive shaft to the low-pressure turbine; and
- coupling a thrust bearing assembly between the low-pressure turbine and a fan assembly to facilitate absorbing the thrust loads generated by the low-pressure turbine and the fan assembly and such that residual thrust loads are transmitted to ground.

7. A method in accordance with claim **1** further comprising coupling a planetary gearbox having a substantially toroidal cross-sectional profile to the drive shaft such that the gearbox substantially circumscribes the drive shaft.

8. A method in accordance with claim **1** further comprising coupling the first rotor section to the gearbox such that the first rotor section rotates in a direction that is opposite to a rotational direction of a fan assembly.

9. A method in accordance with claim **1** further comprising coupling the second rotor section to the gearbox such that the second rotor section rotates in a direction that is opposite to a rotational direction of a fan assembly.

10. A method in accordance with claim **1**, wherein the gearbox includes a gear a plurality of gears, each of the gears including a first gear portion having first diameter and a second gear portion having a second different diameter, said method further comprising:
- coupling the first rotor section to the first gear portion; and
- coupling the second rotor section to the second gear portion such that the first rotor section rotates at a first rotational speed and the second rotor section rotates a rotational speed that is less than the first rotational speed.

11. A turbofan engine assembly comprising:
- a core gas turbine engine including a high-pressure compressor, a combustor, and a high-pressure turbine;
- a low-pressure turbine coupled to said core gas turbine engine;
- a counter-rotating booster compressor comprising a first rotor section configured to rotate in a first direction and a second rotor section configured to rotate in an opposite second direction; and
- a gearbox comprising an input and an output, said gearbox output coupled to at least one of said first and second rotor sections, said gearbox input coupled to said low-pressure turbine.